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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to the data reproduction apparatus which reproduces the music data etc. which were recorded on the recording medium.
[0002]
[Description of the Prior Art]The optical disc is used as a recording medium for carrying out record reproduction of the music data. As such an optical disc, a compact disk (CD) and the thing called more what is called a mini disc with a diameter of 64 mm of a byway are typical.
[0003]Drawing 8 shows the data structure of the optical disc with an above-mentioned diameter of 64 mm as an example of the optical disc in which music data is recorded.
[0004]using human being's aural characteristic (masking effect), the amplitude of a music signal raises time resolution in the portion which changes suddenly, and the music data recorded on this optical disc controls effective transmission and quantization noise of a signal component accommodative -- data volume -- about -- compression encoding is carried out to one fifth. He trichotomizes a frequency band into low-pass, a mid-range, and a high region, and is trying for the time response characteristic to become good by each zone at this time. An optical disc 64 mm in diameter enables it to record the music data for a maximum of 74 minutes as well as a compact disk (CD) by this.
[0005]In the above-mentioned optical disc, as shown in drawing 8 (c), let the data unit which consists of 424 bytes called a sound frame (or sound group) be the minimum record unit.
[0006]As shown in drawing 8 (d), each data of the right-and-left channel is contained in this sound frame.
The real time is 11.6 ms.
The sampling frequency of this optical disc is 44.1 kHz.
1 sound frame consists of 512 samples.

[0007]And as shown in drawing 8 (b), the sector of two main data which consists of even data sectors and odd data sectors is divided into the sound frame of 11 units. This one sector consists of 2352 bytes (data is 2332 bytes before long), and that real time is 63.8 ms.
[0008]As shown in drawing 8 (a), 32 sectors are collectively made into one cluster, and the real time is 2.04 s. Among these, it is a field where the data which the amount of 32 sectors mentioned above, and by which compression encoding was carried out is recorded, and three top sectors are used as the link sector L, and let one sector following it be the sub data S. The data structure of the illustration to drawing 8 (a) is a case of the magneto-optical disc which can also record data.
Let altogether the link sector L for the three above-mentioned sectors be the sub data S in what was made to be the same as that of CD only for playback.

[0009]When playing the music data which has such a structure and which compression encoding was carried out and was recorded on the optical disc, While bundle up to a forward direction, it is made to be transmitted to the decoder for elongation processings and the sound frame of 11 units of each sector **************s a sector number to a forward direction, usually it is assembling to the original music information.
[0010]To the music data currently recorded on the optical disc with an aforementioned diameter of 64 mm. The error correction which eight-to-fourteen modulation (Eight to Fourteen Modulation) is given like CD, and is called ADCIR (Advanced Cross Interleave Reed-Solomon Code) is performed. This ADCIR differs from CIRC (Cross Interleave Reed-Solomon Code) used for CD a little.
It is the method of adding interleave only to data, putting the data on a disk in order in order of real time, and interleaving only the parity of an error correction.
In the following explanation, it is only referred to as CIRC including above ACIRC.
[0011]
[Problem(s) to be Solved by the Invention]By the way, when playing the music data currently recorded on the optical disc etc., When it was going to realize the "loop (Loop) regenerative function" which carries out repetition reproduction, and the "repeat (Repeat)A-B regenerative function" which repeats only the range and is reproduced from the specified starting point A to the terminal point B, while returning from the terminal point of regenerative data to the starting point, there was a problem that a reproduced sound will break off. Once it escaped from the function (mode), when it was going to reproduce the same position, the optical pickup had to access again, data had to be read, and there was a problem that a reproduced sound will break off too in the meantime.
[0012]This invention is performed in order to solve such a problem, and an object of this

invention is to provide the data reproduction apparatus and data reproduction method with which a reproduced sound does not break off, when realizing a loop reproduction function and a repeat regenerative function.

[0013]

[Means for Solving the Problem]A data reproduction apparatus of this invention proposed in order that this invention may solve the above-mentioned technical problem is characterized by that a data reproduction apparatus which has a function which repeats data recorded on a recording medium and is reproduced comprises:

A reading means which reads data in a recording medium.

A starting point setting means for specifying the starting point of the arbitrary range of data which is read as for the account of the upper.

A memory measure which memorizes data which is read as for the account of the upper one by one.

A control means which overwrites data read in the above-mentioned recording medium by the above-mentioned reading means one by one in a storage area except between to a temporary terminal point beforehand set up from the above-mentioned starting point of the above-mentioned memory measure.

[0014]A data reproduction method of this invention proposed in order to solve the above-mentioned technical problem, In a data reproduction method provided with a function which repeats data recorded on a recording medium and is reproduced, The account of the upper with a reading process of reading data in a recording medium A starting point specification process of specifying the starting point of the arbitrary range of data read, It has the memory process of memorizing data read one by one to a memory measure, and the account of the upper is characterized by overwriting data read in the above-mentioned recording medium by the above-mentioned reading means one by one in a storage area except between to a temporary terminal point beforehand set up from the above-mentioned starting point of the above-mentioned memory measure.

[0015]According to above-mentioned this invention, when realizing a loop reproduction function and a repeat regenerative function, a data reproduction apparatus and a data reproduction method with which a reproduced sound does not break off can be provided.

[0016]

[Embodiment of the Invention]Below, it explains, referring to drawings for the desirable embodiment of this invention.

[0017]It is an optical disc which is 64 mm in diameter which the optical disc 1 mentioned above in below, and compression encoding of the music data currently recorded is carried out, and the case where it is what has the sector structure which consists of a sound frame (SF00-

SF0A) which is the minimum record unit as shown in drawing 8 is explained as an example.
[0018]Drawing 1 is a block diagram showing the example of composition of the principal part of the data reproduction apparatus concerning this invention.
[0019]This data reproduction apparatus is what plays the music (audio) data recorded on the optical disc 1 rotated with the spindle motor 2, What is called a scratching effect can be acquired in false like the conventional analog record by carrying out rotatably operating of the dial 18.
[0020]As it is an optical disc which is 64 mm in diameter which the optical disc 1 mentioned above in below, compression encoding of the music data currently recorded is carried out and it was shown in drawing 8, The case where it is what has the sector structure which consists of a sound frame (SF00-SF0A) which is the minimum record unit is explained as an example.
[0021]The data currently recorded on the optical disc 1 is read by the optical head 3 which is a data read means, is made into an RF signal, and after being amplified with RF amplifier 7, it is sent to the EFM/CIRC decoder 8. The address information contained in an RF signal here, After being decoded by the address decoder 10 and carrying out EFM decoding (decoding) processing etc. by the EFM/CIRC decoder 8 with the data from RF amplifier 7, It is stored in RAM(random access memory) 13 which is a data storing means one by one for every sector via the memory controller 12.
[0022]At this time, the field of RAM13 where each of above-mentioned sectors are stored is specified by the drive sector counters (DSC) of the controller 11. The compression music data of 11 sound frame is contained in each sector specified by this DSC.
[0023]On the other hand, in outputting the data of each sector stored in RAM13, The number (Nth sector) of the sector on RAM13 which should be called is specified at the compression encoding data sector counter (ASC) of the system controller 11, and when extension etc. decode it by the compression audio data decoder 14, it is made the original music data. A microcomputer etc. can constitute such a system controller.
[0024]This system controller 11 also has the function to specify the drawing start sector of the data stored in RAM13.
[0025]While RAM13 plays the music data currently recorded on the optical disc 1, When reading of the data from the optical disc 1 becomes impossible by disturbance, it is provided from the former as what is called a shockproof memory for keeping the audio output outputted from breaking off. When data is stored in this RAM13, a transfer rate is 1.4M bit per second, and the transfer rate is made into 0.3M bit per second when taking out data from RAM13. For example, in using DRAM (dynamic RAM) whose storage capacity is 1M bit, the compressed audio data read in the optical disc 1 can be accumulated 2 seconds or more, and the regeneration time will be about 10 seconds. If this is used, it is realizable to play continuously the data currently recorded discontinuously on the optical disc 1 etc. by changing an order at

the time of taking out the data stored in RAM13 if needed.
[0026]Specifically, the dial 18 which is a drawing start sector setting means which can specify the above-mentioned drawing start sector arbitrarily according to that rotation is connected to this system controller 11. The rotation detector 17 detects the rotation and revolving speed at the time of the dial 18 rotating from a center valve position to either right or left, and sends a rotation detection signal to the system controller 11. The system controller 11 changes the number of the drawing start sector of the data from RAM13 according to this rotation detection signal. As such a dial 18, what is called what is called a jog dial can be used.
[0027]The system controller 11 is provided also with the function to specify the sector of the data taken out from RAM13 via the memory controller 12 as storing order one by one by a reverse order from the above-mentioned drawing start sector. Thereby, with storing order, the sound frame in the sector specified from the system controller 11 is taken out from RAM13 one by one by a reverse order, and the memory controller 12 sends it to the compression audio data decoder 14.
[0028]The compression audio data decoder 14 is for carrying out elongation processing of the data by which compression encoding is carried out, and making it the original music data. The elongated data is changed into an analog audio signal with D/A converter 15, and is outputted from the terminal 16.
[0029]The speed of the music data reproduced can be changed according to rotation of the dial 18. The variable clock (CLK) 9 is the clock signal generating part from which it was made for oscillating frequency to change according to rotation of the dial 18. The reproduction speed of the music data outputted from the terminal 16 can be changed by changing the working speed of each part, such as the memory controller 12, the compression audio data decoder 14, and D/A converter 15, with the clock from this variable clock 9.
[0030]The indicator 20 for this data reproduction apparatus to display an operating state etc. and the key part 19 for an operational input are connected to the system controller 11. This key part 19 is used in order to specify the starting point and the terminal point where repetition reproduction of [at the time of using a "loop reproduction function" and a "repeat A-B regenerative function"] is carried out.
[0031]Next, input and output of the data of RAM13 of the data reproduction apparatus mentioned above are explained.
[0032]Drawing 2 shows typically the appearance of the data stored in above RAM13.
[0033]The music data and address information which were read in the optical disc 1 are stored in RAM13 one by one for every sector via the memory controller 12. At this time, the data stored in RAM13 is the data as which the sector number was specified with the counter value of the drive sector counters (DSC) of the system controller 11.
[0034]On the other hand, when reading the data stored in RAM13, the compressed data as

which the sector number was specified with the counter value of the compressed-audio-data sector counters (ASC) of the system controller 11 is read.

[0035]Here, it is assumed that the data from the sector number 0 to sector number N is stored in RAM13. At the time of the usual reproduction motion, these data is read one by one in order of the stored order 0, 1, and 2, i.e., sector numbers, ..., and N. Thereby, an audio signal is reproduced without a break.

[0036]Supposing repeating the data range to the sector number 10 which uses the sector number 4 as the drawing start sector A of data, and is made the terminal point B by operation of the dial 18 on the other hand, and reproducing is specified, The system controller 11 repeats read operation via the memory controller 12 in order of the sector numbers 4 and 5, ..., 9, 10, 4 and 5, and ... By this, the reproducing output of the music data from the sector number 4 to the sector number 10 will be carried out repeatedly.

[0037]Drawing 3 shows the still more detailed example about the structure of the data stored in RAM13.

[0038]When this optical disc 1 is an optical disc which is 64 mm in diameter, music data is recorded with the address information on the optical disc 1, and music data and address information are stored in both RAM13.

[0039]A part of sector parameter of the sector in front of one (the N-1st) is recorded on 12 bytes to the addresses 000-00B made into the free space of the Nth sector. In the following explanation, these addresses presuppose that it is the hexadecimal notation.

[0040]It is considered as a header area and 4 bytes which consists of the next addresses 00C, 00D, 00E, and 00F of data of a cluster (L), a cluster (H), a sector, decoder status, etc. are recorded. Sub data are recorded on 4 bytes of the next addresses 010-013.

[0041]The audio information by which compression encoding was carried out is divided into the sound frame (SF00-SF0A) made into the minimum record unit mentioned above by 2332 bytes of the addresses 014-92F, and is recorded on them.

[0042]12 bytes to the next addresses 930-93B. It is considered as a SYNC field and parity C2PO status is recorded on the address 930,931. The addresses 932-93A are set to "FF", and 93B is set to "00."

[0043]A part of this sector parameter (the Nth) is recorded on 4 bytes of the last addresses 93C-93F, and that remainder is succeedingly recorded also on the field of the following sector (the N+1st).

[0044]Although TOC (Table of Contets) which is an information table showing the contents with the above-mentioned audio information by which compression encoding was carried out is also created by RAM13, the graphic display is omitted here.

[0045]Next, the data reproduction method concerning this invention is explained. It explains referring to the composition of the data reproduction apparatus concerning this invention

mentioned above below.

[0046]In the data reproduction apparatus concerning this invention mentioned above, when drawing 4 realizes a "loop reproduction function" and a "repeat A-B regenerative function" (only henceforth repetition playback), it shows typically signs that the music data read in the optical disc 1 is memorized one by one by RAM13.

[0047]When using the above-mentioned function, the range of the music data by which repetition reproduction is carried out is specified, when a user operates the dial 18 and the key part 19 and inputs the starting point (starting point SP) and an end point (terminal point EP). The system controller 11 is saved without overwriting the data memorized between starting point SP and terminal point EP which are memorized by RAM13 according to this.

[0048]The data reproduction apparatus concerning this invention mentioned above has prevented the reproduced sound outputted breaking off, as the optical pickup 3 is not accessed by repeating and reading the data between starting point SP and terminal point EP which were saved this RAM13.

[0049]If the data memorized by RAM13 is read from starting point SP one by one and an ASC counter value specifically reaches terminal point EP as shown in drawing 4 (a), it will set to ASC counter value = starting point SP again. Thereby, the data of the range specified by a user is reproduced continuously repeatedly. In the position in which data was saved on RAM13 also once escaping from operation of a "loop reproduction function" and a "repeat A-B" regenerative function. When using a "loop reproduction function" and a "repeat A-B" regenerative function again, it can carry out in an instant only by specifying it as ASC counter value = starting point SP.

[0050]Here, it is performed as follows, when a DSC counter value reaches the maximum RAMmax of the storage capacity of RAM13 when the data volume between starting point SP and terminal point EP exceeds the storage capacity of RAM13 namely.

[0051]That is, as shown in drawing 4 (b), provisional terminal point EP1 [temporary so to speak] is beforehand set up within the section with the beginning between starting point SP-terminal point EPs. The storage capacity between this starting point SP and temporary terminal point EP1 should just be capacity for which it is sufficient in order to keep the reproduced sound by the data read from RAM13 to within a time [to which the optical head 3 accesses the data of the request on the optical disc 1] from breaking off.

[0052]And after returning the address value of the storage area where the data of RAM13 is written in to 0, data is overwritten one by one. When data is not overwritten in the address equivalent to the storage area between terminal point EPs with starting point SP at this time but the written-in data reaches starting point SP, it jumps to the address equivalent to EP+1, and data is again overwritten from there.

[0053]That is, only the data memorized by section SP-EP1 (SP<EP1<EP) which has the

beginning between starting point SP and terminal point EP among the data which is memorized by RAM13, and by which repetition reproduction should be carried out is saved, without being overwritten. And while the ASC counter is specifying and carrying out the reproducing output of the data of the range of starting point SP-temporary terminal point EP1, access processing of the optical head 3 is performed and the data between temporary terminal point EP1-terminal point EPs specified with a DSC counter value is incorporated.

[0054]Next, the procedure of incorporating the data on the optical disc 1 into RAM13 is explained concretely.

[0055]When making RAM13 memorize the data read in the optical disc 1 as mentioned above, the address of data is specified using the DSC counter value of the system controller 11.

[0056]Drawing 5 is a flow chart which shows the fundamental procedure at the time of writing data in RAM13.

[0057]first, the step S1 -- a DSC counter value -- 0 -- carrying out (initialization) -- it is carried out.

[0058]Next, it is judged at Step S2 whether a "loop reproduction function" is used. Here, in using a "loop reproduction function", it progresses to Step S3, and in not using a "loop reproduction function", it progresses to Step S5.

[0059]In Step S3, it is judged whether the optical head 3 completed access in the position of the request on the optical disc 1. When access is not completed, it waits until it completes. And if access is completed, it will progress to step S4.

[0060]In step S4, compressed audio data are read in the optical disc 1, and it is written in the address of RAM13 specified with a DSC counter value.

[0061]In Step S5, it is judged in the "RIRUPU regenerative function" mentioned later whether a function is used or not. Here, in using a "RIRUPU regenerative function", it progresses to Step S6, and in not using a "RIRUPU regenerative function", it progresses to Step S14 and only 1 **************s a DSC counter value.

[0062]In Step S6, it is judged whether starting point SP is ending with setting out. When starting point SP has not set up, it progresses to Step S11, and it **************s a DSC counter value only 1. On the other hand, when starting point SP is ending with setting out, it progresses to Step S7.

[0063]In Step S7, it is judged whether terminal point EP is ending with setting out. When terminal point EP has not been set up, it progresses to Step S12, and it is judged whether the DSC counter value has reached starting point SP. On the other hand, when terminal point EP is ending with setting out, it progresses to Step S8.

[0064]In Step S8, it is judged whether the DSC counter value has reached starting point SP. When the DSC counter value is not starting point SP, it progresses to Step S11, and it **************s a DSC counter value only 1. On the other hand, when the DSC counter value

has reached starting point SP, it progresses to step S9.
[0065]In step S9, it is judged whether terminal point EP amounts to temporary terminal point EP1. Here, when terminal point EP is smaller than temporary terminal point EP1, it progresses to Step S10 and a DSC counter value is set to terminal point EP+1. On the other hand, when terminal point EPs are one or more temporary terminal point EPs, it progresses to Step S13 and a DSC counter value is set to temporary terminal point EP1+1.
[0066]In Step S12, it is judged whether the DSC counter value has reached starting point SP. When the DSC counter value is not starting point SP, it progresses to Step S14, and it **************s a DSC counter value only 1. On the other hand, when the DSC counter value has reached starting point SP, it progresses to Step S13, and a DSC counter value is set to EP+1.
[0067]And it progresses to Step S15 from Step S10, Step S11, Step S13, and Step S14, and it is judged whether a "loop reproduction function" is suspended (STOP). When the stop of a "loop reproduction function" is chosen, processing is ended as it is. On the other hand, when not suspending a "loop reproduction function", it progresses to Step S16 and it is judged whether the DSC counter value has reached the upper limit RAMmax of the storage capacity of RAM13. And when a DSC counter value is below RAMmax, it returns to Step S3, and the above-mentioned procedure is repeated. On the other hand, when a DSC counter value is larger than RAMmax, it returns to Step S1 and the above-mentioned procedure is repeated.
[0068]By the above procedure, the data read in the optical disc 1 is memorized one by one by RAM13.
[0069]The above-mentioned "RIRUPU (ReLoop) regenerative function" is a function in which this section is renewable using the data of this section not being overwritten at the arbitrary times, once starting point SP and terminal point EP are set up.
[0070]Next, the data memorized by RAM13 is taken out and the fundamental procedure at the time of performing repetition reproduction of a "loop reproduction function", a "repeat regenerative function", etc., etc. is explained.
[0071]As mentioned above, when taking out data from RAM13, the address of data is specified using the counter value of counter ASC of the system controller 11.
[0072]Drawing 6 and drawing 7 are flow charts which show the fundamental procedure at the time of taking out data from RAM13.
[0073]First, it waits until data sufficient in order that an ASC counter value may be set to 0 (initialization) and may carry out a reproducing output at Step S21 is stored. At this time, an ASC counter value is smaller than a DSC counter value.
[0074]Next, it is judged at Step S22 whether a "loop reproduction function" is used. Here, in using a "loop reproduction function", it progresses to Step S24, and in not using a "loop reproduction function", it progresses to Step S23 mentioned later.

[0075]In Step S24, it is judged whether an ASC counter value is beyond a DSC counter value when the data is read in the optical disc 1 and stored in RAM13. If it becomes smaller than waiting and a DSC counter value until it becomes smaller than a DSC counter value, when an ASC counter value is beyond a DSC counter value, it will progress to Step S25.
[0076]In Step S25, it is judged whether starting point SP is ending with setting out. When starting point SP has not set up, it progresses to Step S30, and it **************s an ASC counter value only 1. On the other hand, when starting point SP is ending with setting out, it progresses to Step S26.
[0077]In Step S26, it is judged whether terminal point EP is ending with setting out. When terminal point EP has not been set up, it progresses to Step S31. On the other hand, when terminal point EP is ending with setting out, it progresses to Step S27.
[0078]In Step S27, it is judged whether the ASC counter value has reached starting point SP. When the ASC value is not starting point SP, it progresses to Step S30, and it **************s an ASC counter value only 1. On the other hand, when the ASC counter value has reached starting point SP, it progresses to Step S28.
[0079]In Step S28, it is judged whether the ASC counter value has reached terminal point EP. Here, when an ASC counter value is more than terminal point EP, it progresses to Step S29 and an ASC counter value is set to starting point SP. On the other hand, when an ASC counter value is smaller than terminal point EP, it progresses to Step S30 and **************s an ASC counter value only 1.
[0080]In Step S31, it is judged whether the ASC counter value has reached starting point SP. When an ASC counter value comes to be starting point SP, it progresses to Step S32, and an ASC counter value is set to temporary terminal point EP1+1. On the other hand, when the DSC counter value is not starting point SP, it progresses to Step S33, and only one ASC counter value is **************ed.
[0081]And it progresses to Step S39 from Step S29, Step S30, Step S32, and Step S33, and compressed audio data are transmitted to the compression audio data decoder 14.
[0082]Next, it is judged at Step S40 whether a "loop reproduction function" is suspended (STOP). When the stop of a "loop reproduction function" is chosen, processing is ended as it is. On the other hand, when not suspending a "loop reproduction function", it progresses to Step S41 and it is judged whether the ASC counter value has reached terminal point EP. And when an ASC counter value is below terminal point EP, it returns to Step S24, and the above-mentioned procedure is repeated. On the other hand, when an ASC counter value is smaller than terminal point EP, it returns to Step S21 and the above-mentioned procedure is repeated.
[0083]The reproducing output of the data which was read in the optical disc 1 and memorized one by one by RAM13 by the above procedure is taken out and carried out.
[0084]In Step S23, it is judged in the above-mentioned "RIRUPU regenerative function"

whether a function is used or not. Here, in using a "RIRUPU regenerative function", it progresses to Step S24, and when not using a "RIRUPU regenerative function", each step after Step S34 shown in drawing 7 is performed.

[0085]In Step S34, it is judged whether SE and terminal point EP are ending with setting out. When starting point SP and terminal point EP are ending with setting out, it progresses to Step S35. On the other hand, when starting point SP and terminal point EP are not ending with setting out, it progresses to Step S39 and **************s an ASC counter value only 1.

[0086]In Step S35, it is judged whether the ASC counter value has reached starting point SP. When the ASC counter value is not starting point SP, it progresses to Step S39, and it **************s an ASC counter value only 1. On the other hand, when the ASC counter value has reached starting point SP, it progresses to Step S36.

[0087]In Step S36, it is judged whether terminal point EP amounts to temporary terminal point EP1. Here, when terminal point EPs are one or more temporary terminal point EPs, it progresses to Step S38 and an ASC counter value is set to temporary terminal point EP1+1. On the other hand, when terminal point EP is smaller than temporary terminal point EP1, it progresses to Step S37 and an ASC counter value is set to terminal point EP+1.

[0088]And as it progressed and mentioned above from Step S37, Step S38, and Step S39 to Step S39, each subsequent step is performed in a similar manner.

[0089]If starting point SP and terminal point EP have not been set up at this time, a DSC counter value will usually be **************ed like the time until it is set up.

[0090]In order to use it for a "loop reproduction function" between starting point SP and terminal point EP, it is kept from overwriting among the data memorized by RAM13, when the above procedure is summarized and starting point SP and terminal point EP are ending with setting out (loop reproduction function). That is, when the DSC counter value is **************ed and a DSC counter value reaches the maximum (RAMmax) of the storage capacity of RAM13, a DSC counter value is set to 0 and **************ed again, but it is again set to DSC counter value = starting point SP. At this time, if terminal point EP is small enough, by setting a DSC counter value to terminal point EP+1, data is not overwritten between starting point SP and terminal point EP, but it saves the data between starting point SP and terminal point EP. When terminal point EP is larger than a certain decided value (temporary terminal point EP1), starting point SP is set to temporary terminal point EP1+1, and it keeps from on the other hand overwriting data between starting point SP and temporary terminal point EP1.

[0091]When starting point SP has not set up terminal point EP by ending with setting out, it **************s a DSC counter value until terminal point EP is set up, but since there is a limit in the storage capacity of RAM13, a DSC counter value reaches starting point SP like the case where it is the above. However, since terminal point EP has not been set up yet, it leaves only a minimum storage area (starting point SP-temporary terminal point EP1) required in order to

keep a regenerative signal from breaking off within the access time of the optical head 3, and a DSC counter value is set to temporary terminal point EP1+1. Then, what is necessary is to memorize only the address on the disk of terminal point EP, to set a DSC counter value to temporary terminal point EP1+1, whenever an ASC counter value reaches starting point SP, and just to read the data after temporary terminal point EP1 from a disk again, when terminal point EP is set up.
[0092]When neither starting point SP nor terminal point EP has been set up, an ASC counter value is **************ed and the upper limit (RAMmax) of the storage capacity of RAM13 is reached like the usual reproduction motion, an ASC counter value is set to 0 and reproduction is continued.
[0093]When an ASC counter value has not set up terminal point EP by ending with setting out, the usual reproduction motion is continued until terminal point EP is set up. When an ASC counter value once reaches the upper limit RAMmax of the storage capacity of RAM13 and reaches starting point SP at this time, [as well as a DSC counter value] Since the data after starting point SP uses it for a "loop reproduction function", an ASC counter is set to temporary terminal point EP1+1, and the ASC counter value is **************ed after temporary terminal point EP1+1.
[0094]Although the "loop reproduction function" is not set up, since it may be again used for a "loop reproduction function" between starting point SP-terminal point EPs when starting point SP and terminal point EP are already set up (RIRUPU function), data in the meantime is not reproduced. Therefore, when set to ASC counter value = starting point SP, if it is terminal point EP< temporary terminal point EP1, will set an ASC counter value to terminal point EP+1, and if it is terminal point EP>= temporary terminal point EP1, By setting an ASC counter value to temporary terminal point EP1+1, the storage area for using it for a "loop reproduction function" is reproduced by jumping.
[0095]Also when the data volume of the range specified that repetition reproduction is carried out exceeds the maximum RAMmax of the storage capacity of RAM13 according to the procedure which was explained above, the sound by which a reproducing output is carried out does not break off. Since it is not necessary to read data from an optical disc again once it specifies the repetition section, the section is continuously renewable any number of times.
[0096]As for this invention, although the case where music data was recorded on an optical disc as a recording medium was made into the example in the above explanation, it is needless to say for it to be able to apply also to other recording media, such as a magnetic disk. The data reproduction apparatus concerning this invention may be constituted as some recording and reproducing devices provided with the function which records data on a recordable recording medium.
[0097]

[Effect of the Invention]Since according to this invention it secured so that the field which memorizes the data of data volume corresponding in the memory which once stores the data read in the optical disc at time required for access of an optical pickup at least might not be overwritten, The data reproduction apparatus and data reproduction method which have a "loop reproduction function" without a sound piece and a "repeat A-B regenerative function" can be provided.
[0098]And it is not necessary to add the memory measure for realizing the above-mentioned function in a data reproduction apparatus provided with memory measures, such as what is called a shockproof memory.

[Translation done.]